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# In Memory of Dr. David Starr Jordan

It is with deepest sorrow that we, the members of the Pan-Pacific Research Institution, learn of the death at Palo Alto, on Sept. 19, 1931, of our beloved friend and coworker, David Starr Jordan, Ex-President and Chancellor-Emeritus of Stanford University.

Dr. Jordan was one of the founders of the Pan-Pacific Research Institution, and its first president as well as the most earnest supporter of its aims and ideals. He, with the members of the Pan-Pacific Science Council, in 1925 drew up the outline of purpose of the Institution and aided greatly in getting the work well under way. He believed that here in the Mid-Pacific might be developed a great democracy of scientists whose influence in every field of human welfare, including both science and statecraft, as they affected not only the Pacific, but world relations, could be founded. Many of the notable inter-Pacific, if not international, conferences that have been held in Hawaii in recent years are the outgrowth of Dr. Jordan's genius and vision, by which he inspired others to take hold where he left off.

While honorable chairman of the Pan-Pacific Research Institution to the time of his death, he assumed active chairmanship of the Council on Aquatic Resources when he gave invaluable service to the Council and its workers during the Pan-Pacific Fisheries Conference, the beneficial results of which compass the whole Pacific Region.

In the death of David Starr Jordan our Institution, as well as the entire American Commonwealth, sustains one of its greatest losses. Dr. Jordan was one of the foremost educators and scientists, as well as publicists, that America has claimed in the past generation. A leader who mingled with all the people and gave the best he had to give for more than half a century.

Honolulu, T. H., Oct. 2, 1931.

*Theo. C. Zschokke,*
*E. H. Bryan, Jr.,*
*F. G. Krauss.*

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# A Check List of Fishes Recorded from Tahiti

By Albert W. Herre
Stanford University, California.

(Those collected by the author are marked with an *.)

Family Carcharhinidae.
1.—*Carcharias melanopterus Quoy and Gaimard.
Family Galeorhinidae.
2.—Triaenodon obesus (Rüppell).
Family Sphyrnidae.
3.—Sphyrna zygaena (Linnaeus).
Family Myliobatidae.
4.—*Aetobatus narinari (Euphrasen).
Family Megalopidae.
5.—*Megalops cyprinoides (Broussonet); fresh water.
Family Albulidae.
6.—Albula vulpes (Linnaeus).
Family Chanidae.
7.—Chanos chanos (Forskål).
Family Clupeidae.
8.—*Stolephorus japonicus (Houttuyn).
9.—Sardinella gibbosa Bleeker.
10.—Sardinella melanura (Cuvier).
11.—Clupeoides lile (Cuvier and Valenciennes).
Family Dorosomidae.
12.—Clupanodon punctatus (Schlegel).
Family Engraulidae.
13.—Engraulis indica Van Hasselt.
Family Anguillidae.
14.*—Anguilla mauritiana (Bennett); fresh water.
15.—Anguilla celebesensis (Kaup); fresh water.
16.—Anguilla pacifica Schmidt; fresh water.

Family Leptocephalidae.
17.—Poeciloconger fasciatus Günther.
Family Ophichthyidae.
18.—Myrichthys maculosus (Cuvier).
19.—Chlevastes colubrinus (Boddaert).
20.—Callechelys marmoratus (Bleeker).
21.—Leiuranus semicinctus (Lay and Bennett).
22.—Brachysomophis crocodilinus (Bennett).
23.—Brachysomophis henshawi Jordan and Snyder.
24.—(See footnote.)
25.—*Achirophichthys kampeni (Weber and Beaufort); fresh water.
26.—Caecula catostomus (Bloch and Schneider).
27.—Caecula polyophthalma (Bleeker).
28.—Caecula macrodon (Bleeker).
Family Moringuidae.
29.—Aphthalmichthys abbreviatus Bleeker.
Family Muraenidae.
30.—Echidna zebra (Shaw).
31.—Echidna polyzona (Richardson).
32.—*Echidna nebulosa (Ahl).
33.—Muraena pardalis (Schlegel).
34.—*Gymnothorax pictus (Ahl).
35.—Gymnothorax meleagris (Shaw).
36.—Gymnothorax undulatus (Lacépède).
37.—Gymnothorax zonipectus Seale.
38.—Gymnothorax chilospilus Bleeker.
39.—*Gymnothorax richardsoni (Bleeker).
40.—Gymnothorax monostigma (Regan).
41.—Enchelynassa canina (Quoy and Gaimard).
42.—Uropterygius tigrinus (Lesson).
43.—Uropterygius polyspilus (Regan).
44.—*Uropterygius concolor Rüppell.
45.—Uropterygius supraforatus (Regan).
Family Synodontidae.
46.—Trachinocephalus myops (Bloch and Schneider).
47.—Synodus varius Lacépède.
48.—Saurida gracilis (Quoy and Gaimard).
Family Belonidae.
49.—Strongylura tahitiensis Fowler and Bean.
50.—Tylosurus choram (Rüppell).
51.—*Tylosurus melanotus (Bleeker).
Family Hemiramphidae.
52.—Hemiramphus dussumieri Cuv. and Val.
53.—Hemiramphus far (Forskål).
Family Exocoetidae.
54.—Parexocoetus brachypterus (Richardson).
55.—Exocoetus volitans Linnaeus.
56.—Cypselurus furcatus (Mitchill).
57.—Cypselurus poecilopterus (Cuv. and Val.).
58.—*Cypselurus spilopterus (Cuv. and Val.).
59.—Cypselurus oligolepis (Bleeker).
60.—Cypselurus tahitiensis Seale.
61.—Cypselurus simus (Cuv. and Val.).
Family Pleuronectidae.
62.—Platophrys mancus (Broussonet).
63.—Platophrys pantherinus (Rüppell).
64.—Pseudorhombus triocellatus (Bloch and Schneider).
Family Holocentridae.
65.—Holocentrus rubellio Seale.
66.—*Holocentrus caudimaculatus Rüppell.
67.—Holocentrus erythraeus Günther.
68.—Holocentrus tiere Cuv. and Val.
69.—*Holocentrus tiereoides Bleeker.
70.—Holocentrus lacteoguttatus Cuv. and Val.
71.—*Holocentrus laevis Günther.
72.—Holocentrus violaceus Bleeker.
73.—*Holocentrus diadema Lacépède.
74.—Holocentrus microstomus Günther.
75.—*Holocentrus sammara (Forskål).
76.—*Holocentrus opercularis Cuv. and Val.
77.—*Holotrachys lima Cuv. and Val.
78.—Myripristis murdjan (Forskål).
79.—Myripristis adustus Bleeker.
80.—*Myripristis intermedius Günther.
81.—*Myripristis microphthalmus Bleeker.
82.—*Myripristis pralinius Cuv. and Val.
Family Syngnathidae.
83.—Microphis brachyurus Bleeker.
84.—*Corythoichthys conspicillatus (Jenyns).
85.—Hippocampus histrix Kaup.
Family Aulostomidae.
86.—*Aulostoma valentini (Bleeker).
Family Fistulariidae.
87.—*Fistularia petimba (Lacépède).
Family Mugilidae.
88.—*Mugil engeli Bleeker; fresh water.
89.—Mugil cephalus Linnaeus.
90.—Mugil kelaartii Günther.
91.—Mugil crenilabris Forskål.
92.—Liza borneensis (Bleeker).
93.—*Liza melinoptera (Cuv. and Val.).
94.—*Liza seheli (Forskål).
95.—*Liza troscheli (Bleeker).
96.—*Liza vaigiensis (Quoy and Gaimard).
97.—Myxus leuciscus Günther.
98.—*Chaenomugil chaptali (Eydoux and Souleyet).
Family Sphyraenidae.
99.—Sphyraena barracuda (Walbaum).
100.—Sphyraena forsteri Cuv. and Val.
Family Polynemidae.
101.—*Polynemus indicus Shaw.
102.—Polynemus plebeius (Bonnaterre).
103.—Polynemus sexfilis Cuv. and Val.
Family (Scombridae) Thynnidae
104.—Euthynnus pelamis (Linnaeus).
105.—Euthynnus alleteratus (Rafinesque).
106.—Neothunnus macropterus (Schlegel).
Family Cybiidae.
107.—Acanthocybium solandri (Cuv. and Val.).
Family Gempylidae.
108.—Gempylus serpens Cuvier.
109.—Promethichthys prometheus (Cuv. and Val.).
110.—*Ruvettus pretiosus Cocco.
Family Istiophoridae.
111.—Istiophorus sp.
112.—Tetrapterus sp.
Family Xiphiidae.
113.—Xiphias gladius Linnaeus.
Family Coryphaenidae.
114.—Coryphaena hippurus Linnaeus.
115.—Coryphaena equisetis Linnaeus.
Family Bramidae.
116.—Collybus drachme Snyder.
Family Carangidae.
117.—*Scomberoides sancti-petri (Cuv. and Val.).
118.—Naucrates ductor (Linnaeus).

Owing to error in Ms. No. 24 was omitted and No. 375 duplicated. The total number remains the same.

119.—*Elegatis bipinnulatus (Quoy and Gaimard).
120.—*Decapterus sanctae-helenae (Cuv. and Val.).
121.—*Trachurops macrophthalmus (Rüppell).
122.—Trachurops crumenophthalmus (Bloch).
123.—Caranx affinis Rüppell.
124.—Caranx elacate Jordan and Evermann.
125.—Caranx helvolus (Bloch and Schneider).
126.—*Caranx sansun (Forskål); fresh water.
127.—*Caranx sexfasciatus Quoy and Gaimard; fresh water.
128.—*Caranx stellatus Eydoux and Souleyet.
129.—Caranx melampygus Cuv. and Val.
130.—Caranx ignobilis (Forskål).
131.—Caranx forsteri Cuv. and Val.
132.—Caranx ferdau (Forskål).
133.—Caranx ajax (Snyder).
134.—Gnathanodon speciosus (Forskål).
135.—Alectis ciliaris (Bloch).

Family Leiognathidae.

136.—Leiognathus equula (Forskål).
137.—Leiognathus dussumieri (Cuv. and Val.).
138.—Leiognathus fasciatus (Lacépède).
139.—Secutor insidiator (Bloch).
140.—Gazza minuta (Bloch).

Family Apogonidae.

141.—*Apogon apogonides (Bleeker).
142.—*Apogon aroubiensis Hombron and Jacq.
143.—*Apogon bandanensis Bleeker.
144.—Apogon crassiceps Garman.
145.—*Apogon exostigma (Jordan and Seale).
146.—*Apogon frenatus Valenciennes.
147.—Apogon novemfasciatus Cuv. and Val.
148.—Apogonichthys auritus (Cuv. and Val.).
149.—*Apogonichthys perdix Bleeker.
150.—*Cheilodipterus quinquelineatus Cuv. and Val.

Family Kuhliidae.

151.—*Kuhlia marginata (Cuv. and Val); fresh water.
152.—Kuhlia rupestris (Lacépède); fresh water.
153.—*Kuhlia taeniura (Cuv. and Val.).
154.—Kuhlia malo (Cuv. and Val.).
155.—Kuhlia boninensis (Fowler).
156.—Kuhlia sandvicensis (Steindachner).

Family Serranidae.

157.—*Cephalopholis argus Bl. and Schn.
158.—Cephalopholis aurantius (Cuv. and Val.).
159.—Cephalopholis leopardus (Lacépède).
160.—*Cephalopholis miniatus Forskål.
161.—Cephalopholis urodelus (Bl. and Schn.).
162.—Cephalopholis sexmaculatus (Rüppell).
163.—Epinephelus corallicola (Kuhl and Van Hass.).
164.—Epinephelus fasciatus (Forskål).
165.—*Epinephelus merra Bloch.
166.—*Epinephelus ongus (Bloch).
167.—Epinephelus quernus Seale.
168.—Grammistes sexlineatus (Thunberg).

Family Pseudochromidae.

169.—*Pseudogramma polyacanthus Bleeker.

Family Priacanthidae.

170.—*Priacanthus cruentatus (Lacépède).
171.—Priacanthus hamrur (Forskål).

Family Pempheridae.

172.—Pempheris otaitensis Lesson.

Family Lutianidae.

173.—Lutianus bohar (Forskål).
174.—Lutianus fulviflamma (Forskål).
175.—Lutianus fulvus (Bl. and Schn.).
176.—Lutianus gibbus (Forskål).
177.—Lutianus johnii (Bloch).
178.—Lutianus kasmira (Forskål).
179.—*Lutianus marginatus (Cuv. and Val.).
180.—*Lutianus monostigma (Cuv. and Val.).
181.—Pristipomoides sieboldi (Bleeker).
182.—Etelis evurus Jordan and Evermann.
183.—Etelis marshi (Jenkins).

Family Pomadasidae.

184.—Plectorhinchus orientalis (Bloch).

Family Sparidae.

185.—*Lethrinus miniatus (Forster).
186.—*Lethrinus variegatus Ehrenberg.
187.—Gnathodentex aureo-lineatus (Lacépède).
188.—*Monotaxis grandoculis (Forskål).

Family Kyphosidae.

189.—Kyphosus fuscus (Lacépède).
190.—Kyphosus waigiensis (Quoy and Gaimard).

Family Mullidae.

191.—Upeneoides arge (Jordan and Evermann).
192.—Upeneoides vittatus (Forskål).
193.—*Upeneus barberinus (Lacépède).
194.—*Upeneus bifasciatus (Lacépède).
195.—Upeneus luteus Cuv. and Val.
196.—Upeneus macronemus (Lacépède).
197.—*Upeneus moana (Jordan and Seale).
198.—Upeneus pleurostigma Bennett.
199.—Upeneus chryserydros (Lacépède).
200.—Mulloides auriflamma (Forskål).
201.—Mulloides erythrinus Klunzinger.
202.—*Mulloides samoensis Günther.

Family Malacanthidae.

203.—Malacanthus hoedti Bleeker.

Family Cirrhitidae.

204.—Cirrhitus pinnulatus (Bl. and Schneider).
205.—Paracirrhites polystictus (Günther).
206.—Paracirrhites forsteri (Bloch and Schneider).
207.—Paracirrhites arcatus (Cuv. and Val.).

Family Scatophagidae.

208.—Scatophagus argus (L.).

Family Chaetodontidae.

209.—Forcipiger longirostris (Broussonet).
210.—Chaetodon auriga Forskål.
211.—*Chaetodon citrinellus Cuv. and Val.
212.—Chaetodon ephippium Cuv. and Val.
213.—*Chaetodon fasciatus (Forskål).
214.—Chaetodon ornatissimus (Solander).
215.—Chaetodon reticulatus Cuv. and Val.
216.—Chaetodon strigangulus (Solander).
217.—Chaetodon trichrous Günther.
218.—*Chaetodon trifasciatus Park.
219.—*Chaetodon ulietensis Cuv. and Val.
220.—*Chaetodon unimaculatus Bloch.
221.—*Chaetodon vagabundus Linnaeus.
222.—Heniochus acuminatus (Linnaeus).
223.—*Heniochus permutatus Cuv. and Val.
224.—Heniochus monoceros Cuv. and Bloch.
225.—Holacanthus bispinosus Günther.
226.—*Holacanthus flavissimus Cuv. and Val.
227.—Holacanthus imperator (Bloch).

Family Zanclidae.

228.—*Zanclus canescens (Linnaeus).
229.—*Zanclus cornutus (Linnaeus).

Family Acanthuridae.

230.—Acanthurus achilles (Shaw).
231.—*Acanthurus aliala Lesson.
232.—Acanthurus celebicus Bleeker.
233.—Acanthurus dussumieri Cuv. and Val.
234.—Acanthurus elongatus (Lacépède).
235.—Acanthurus guttatus Bl. and Schn.
236.—Acanthurus lineatus (Linnaeus).
237.—*Acanthurus matoides Cuv. and Val.
238.—Acanthurus olivaceus Bl. and Schn.
239.—*Acanthurus triostegus (Linnaeus).
240.—*Ctenochaetus strigosus (Bennett).
241.—*Zebrasoma flavescens (Bennett).
242.—Zebrasoma veliferum (Bloch).
243.—Naso brevirostris (Cuv. and Val.).
244.—Naso annulatus (Quoy and Gaimard).
245.—Naso lituratus (Bloch and Schn.).
246.—Naso unicornis (Forskål).
247.—Naso vlamingi (Cuv. and Val.).

Family Siganidae.

248.—Teuthis javus (Linnaeus).
249.—Teuthis marmorata (Quoy and Gaimard).
250.—Teuthis rostrata (Cuv. and Val.).
251.—*Teuthis striolata Günther.

Family Scorpaenidae.

252.—Scorpaenopsis cirrhosus (Thunberg).
253.—Scorpaenopsis cacopsis Jenkins.
254.—Scorpaenopsis gibbosus (Bl. and Schn.).
255.—*Sebastapistes bynoensis (Richardson).
256.—*Scorpaenodes guamensis (Quoy and Gaimard).
257.—*Scorpaenodes scabra (Ramsay and Ogilby).
258.—Pterois antennata (Bloch).
259.—*Pterois radiata Cuv. and Val.
260.—Synanceia verrucosa Bl. and Schn.

Family Caracanthidae.

261.—Caracanthus maculatus (Gray).
262.—Caracanthus unipinna (Gray).

Family Platycephalidae.

263.—Platycephalus fuscus Cuv. and Val.

Family Cephalacanthidae.

264.—Dactyloptena orientalis (Cuv. and Val.).

Family Pomacentridae.

265.—Amphiprion frenatus Brevoort.
266.—Dascyllus aruanus (Linnaeus).
267.—Chromis dimidiatus (Klunzinger).
268.—*Chromis caeruleus (Cuv. and Val.).
269.—*Pomacentrus lividus (Forster).
270.—*Pomacentrus nigricans (Lacépède).
271.—*Pomacentrus pavo (Bloch).
272.—Pomacentrus taeniurus Bleeker.
273.—Abudefduf amabilis (De Vis).
274.—*Abudefduf brownriggi (Bennett).
275.—*Abudefduf coelestinus (Cuv. and Val.).
276.—Abudefduf glaucus (Cuv. and Val.).
277.—Abudefduf imparipennis (Vaillant and Sauvage).
278.—Abudefduf lacrymatus (Quoy and Gaimard).
279.—Abudefduf saxatilis (Linnaeus).
280.—Abudefduf sordidus (Forskål).
281.—*Abudefduf uniocellatus (Quoy and Gaimard).
282.—Abudefduf xanthozona (Bleeker).

Family Labridae.

283.—Choerodon anchorago (Bloch).
284.—Choerodon cyanodus (Richardson).
285.—Lepidaplois axillaris (Bennett).
286.—*Epibulus insidiator (Pallas).
287.—Labroides dimidiatus (Cuv. and Val.).
288.—Anampses caeruleo-punctatus Rüppell.
289.—Halichoeres centiquadrus (Lacépède).
290.—*Halichoeres daedalma Jordan and Seale.
291.—*Halichoeres trimaculatus (Quoy and Gaimard).
292.—*Coris aygula (Lacépède).
293.—Coris gaimard (Quoy and Gaimard).
294.—Coris heteroptera (Bleeker).
295.—Hologymnosus semidiscus (Lacépède).
296.—*Thalassoma harwicke (Bennett).
297.—Thalassoma lunare (Linnaeus).
298.—*Thalassoma lutescens (Lay and Bennett).
299.—Thalassoma schwanenfeldi (Bleeker).
300.—*Thalassoma umbrostigma (Rüppell).
301.—Thalassoma purpureum (Forskål).
302.—Thalassoma trilobata (Lacépède).
303.—Thalassoma aneitensis (Günther).
304.—Gomphosus varius Lacépède.
305.—Gomphosus tricolor Quoy and Gaimard.
306.—Cheilio inermis (Forskål).
307.—*Pseudocheilinus hexataenia (Bleeker).
308.—Cheilinus chlorurus Bloch.
309.—*Cheilinus trilobatus Lacépède.
310.—Cheilinus undulatus Rüppell.
311.—Novaculichthys taeniourus (Lacépède).
312.—Novaculichthys kallosoma (Bleeker).
313.—Iniistius pavo (Cuv. and Val.).
314.—Xyrichthys virens Cuv. and Val.

Family Scaridae.

315.—Leptoscarus snyderi (Jenkins).
316.—Leptoscarus vaigiensis (Quoy and Gaimard).
317.—Callyodon bataviensis (Bleeker).
318.—Callyodon blochii (Cuv. and Val.).
319.—Callyodon dubius (Bennett).
320.—Callyodon erythrodon (Cuv. and Val.).
321.—Callyodon formosus (Cuv. and Val.).
322.—Callyodon forsteri (Cuv. and Val.).
323.—Callyodon ghobban (Forskål).
324.—*Callyodon globiceps (Cuv. and Val.).
325.—Callyodon lepidus (Jenyns).
326.—Callyodon moensi (Bleeker).
327.—Callyodon oviceps (Cuv. and Val.).
328.—Callyodon strongylocephalus (Bleeker).
329.—*Callyodon troscheli (Bleeker).

Family Echeneidae.

330.—Echeneis remora Linnaeus.

Family Eleotridae.

331.—*Asterropteryx semipunctatus Rüppell.
332.—*Eleotris fusca (Bl. and Schn.); in fresh water.
333.—*Eviota afelei Jordan and Seale.
334.—*Eviota distigma Jordan and Seale.
335.—Valenciennea strigata (Broussonet).

Family Gobiidae.

336.—*Bathygobius fuscus (Rüppell).
337.—*Rhinogobius neophytus (Günther).
338.—Vailima stevensoni Jordan and Seale.
339.—Oplopomus oplopomus (Cuv. and Val.).
340.—Glossobogius giurus (Buch.-Hamilton).
341.—Gobiodon quinquestrigatus (Cuv. and Val.).
342.—*Paragobiodon echinocephalus (Rüppell).
343.—*Zonogobius semidoliatus (Cuv. and Val.).
344.—*Chonophorus genivittatus (Cuv. and Val.); fresh water.

345.—*Chonophorus ocellaris (Broussonet); fresh water.
346.—*Papenua pugnans (Grant); fresh water.
347.—Sicyopterus taeniurus (Günther).
348.—Apocryptes lanceolatus (Bl. and Schn.).
Family Parapercidae.
349.—Parapercis tetracanthus (Bleeker).
Family Blenniidae.
350.—Petroscirtes quadrimaculatus Kendall and Goldsborough.
351.—Salarias biseriatus Cuv. and Val.
352.—Salarias caesius Seale.
353.—Salarias caudolineatus Günther.
354.—Salarias edentulus (Bl. and Schn.).
355.—Salarias lineatus Cuv. and Val.
356.—Salarias marmoratus (Bennett).
357.—Salarias periophthalmus (Cuv. and Val.).
358.—Salarias saliens (Forster).
359.—*Enchelyurus ater (Günther).
Family Lycodapodiidae.
360.—Dinematichthys iluocoeteoides Bleeker.
Family Brotulidae.
361.—Brotula mulleri Günther.
Family Carapidae.
362.—*Carapus homei (Richardson).
363.—Jordanicus parvipinnis (Kaup).
364.—Encheliophis vermicularis Müller.
Family Balistidae.
365.—*Balistapus aculeatus (Linnaeus).
366.—*Balistapus undulatus (Park).
367.—Balistes bursa Bl. and Schn.
368.—Balistes fuscus Bl. and Schn.
369.—Balistes chrysopterus Bl. and Schn.
370.—*Balistes vidua (Solander) Richardson.
Family Monacanthidae.
371.—Cantherines sandwichiensis (Quoy and Gaimard).
372.—Cantherines howensis (Ogilby).
373.—Osbeckia scripta (Osbeck).
Family Ostraciidae.
374.—*Ostracion cornutus Linnaeus.
375.—Ostracion sebae Bleeker.
375.—*Ostracion tuberculatus Linnaeus.
Family Canthigasteridae.
(See footnote.)
376.—Canthigaster bennetti (Bleeker).
377.—Canthigaster cinctus (Richardson).
378.—Canthigaster solandri (Richardson).
Family Tetraodontidae.
379.—Spheroides hamiltoni (Richardson).
380.—Spheroides lagocephalus (Linnaeus).
381.—Tetraodon hispidus Linnaeus.
382.—Tetraodon meleagris Bl. and Schn.
383.—Tetraodon stellatus Bl. and Schn.
Family Diodontidae.
384.—*Diodon hystrix Linnaeus.
385.—Diodon holacanthus Linnaeus.
Family Antennariidae.
386.—Antennarius bigibbus Lacépède.
387.—Antennarius commersonii (Shaw).
388.—Antennarius hispidus (Bl. and Schn.).
Addendum—Family Labridae.
389.—*Coris pulcherrima Günther.

# A List of the Pentatomidae, Plataspidae, and Coreidae

(order Hemiptera) of China, Korea, and Indo-China.*

By William E. Hoffmann

Professor and Head of Department of Biology, Lingnan University, Canton, China.

During the First Pan-Pacific Food Conservation Conference, held in Honolulu during the summer of 1924, entomologists throughout the Pacific area were urged to prepare lists of insects, especially in groups containing species of considerable economic importance, for their particular regions. Upon arrival in South China the writer soon observed that the Pentatomidae (including the Plataspidae) and Coreidae were of considerable economic importance although practically nothing had been written on the bionomics of these families as they pertain to China Accordingly these families were selected first of all when the preparation of a list was undertaken. The present list has been compiled for the most part from the literature but is based in part on a study of material in the United States National Museum, the Natural History Museum, London, and a collection of Chinese insects made by the writer. Species (and genera) preceded by an asterisk (*) have not been hitherto reported from China proper so far as known to the writer.

## Family PLATASPIDAE

**Tarichea**

1. chinensis Dallas

**Calacta**

2. lugubris Stal

**Oncylaspis**

3. ruficeps Dallas
(= On ruficeps Stal)

**Brachyplatys**

4. carolinae Atkinson
5. deplanatus Stal
(= Scutellera deplanata Eschscholz)

6. punctipes Montandon
7. liturifrons Walker
(= Cimex silphoides Fabricius)
8. subaeneus Breddin
(= Plataspis subaenea (Westwood))
9. vahlii Fabricius

**Coptosoma**

10. aciculata Montandon
11. amplexa Montandon

* Contribution from the Department of Biology.

12. bifaria Montandon
13. biguttula Motshoulsky
14. bilineata Montandon
15. bisoculata Montandon
16. bituminata Montandon
17. breviceps Horvath
18. brevicula Montandon
19. cribraria Fabr.
20. davidi Montandon
21. distanti Montandon
22. excoffieri Montandon
23. fimbriata Distant
24. horvathi Montandon
(= C. howathi Montandon)
25. lasciva Bergroth
26. lobata Walker
27. munda Bergroth
28. notabilis Montandon
29. parviceps Montandon
30. parvipicta Montandon
31. perplexa Montandon
32. prolaticeps Montandon
33. pulchella Montandon
34. var. (b) discincta Mont.
35. var. (c) omnimoda Mont.
36. var. (d) impedita Mont.
37. punctatissima Montandon
38. rabieri Montandon
39. semiflava Jakovlev
40. siamica Walker
41. sordidula Montandon
42. tigrina Stal
43. variegata Montandon
(= Thyreocoris variegatus, H-S.)
44. verrucosa Montandon
45. vollenhoveni Montandon

## Family PENTATOMIDAE

### Subfamily ASOPINAE

**Picromerus**

46. lewisi Scott
47. vicinus Signoret

**Jalla**

48. subcalcarata Jakovlev

**Cantheconidea**

49. concinna Walker
50. thomsoni Distant

**Pinthaeus**

51. humeralis Horvath

**Auriga**

52. chinensis Fallou
53. custos Fabricius
54. discors Jakovlev

**Rhacognathus**

55. distinctus Schouteden
56. punctatus Linnaeus

**Zicrona**

57. caerulea Saunders

**Martinia**

58. inexpectata Schouteden

**Dinorhynchus**

59. opulentus Distant

**Cazira**

Subgenus **Teratocazira**

60. horvathi Breddin

Subgenus **Metacazira**

61. bergrothi Breddin
62. bhoutanica Schouteden
63. montandoni Breddin
64. reuteri Breddin
65. tibetensis Schouteden
66. vegata Kirkaldy

OF DOUBTFUL POSITION

67. Glypsus luridus Dallas

### Subfamily Pentatominae

Tribe *PENTATOMINI*

**Drinostia**

68. fissiceps Stal
69. planiceps Stal

**Euaenaria**

70. jucunda Breddin

**Brachymna**

71. tenuis Stal

**Paterculus**

72. affinis Distant
73. aberrans Distant

**Neoniphe**

74. armata Distant

**Holcostethus**

75. pallescens Jakovlev

**Cappaea**

76. *taprobanensis Dallas

**Halyomorpha**

77. picus Fabricius

**Tolumnia**

78. basalis Dallas
79. ferruginescens Breddin
80. letipes Dallas

**Massocephalus**

81. maculatus Dallas

**Palomena**

82. amplificata Distant
83. limbata Jakovlev
84. rubricornis J. Scott
85. unicolorella Kirkaldy
(= Pentatoma unicolor Westwood)

**Carpocoris**

86. pudicus Poda
87. var. fuscispina (Saunders)
88. var. coreana Distant
(= C. coreanus Distant)
89. baccarum Linnaeus

**Dolycoris**

90. indicus Stal

**Aelia**

91. sibirica Reuter

**Eysarcoris**

92. breviusculus Jakovlev
93. gibbosus Jakovlev
94. guttiger Thunberg
95. megaspilus Walker
96. potanini Jakovlev
97. schmidti Jakovlev

98. ventralis (Westwood)
(= Eusarcocoris ventralis Distant)

**Rubiconia**

99. intermedia Fieber
100. peltata Jakovlev

**Carbula**

101. crassiventris Distant
102. eoa Bergroth
103. obtusangula Reuter

**Cellobius**

104. gentilis Jakovlev

**Agonoscelis**

105. nubilis Fabricius

**Eurydema**

106. festiva Linnaeus
107. gebleri Gmelin
108. lituriferum var. yunnanensis China
109. pulchra (Westwood)
110. rugosa Motshulsky

**Capnoda**

111. batesoni Jakovlev
112. nigroaenea Jakovlev

**Alcimocoris**

113. potanini Horvath

**Sacontala**

114. rugulosa Distant

**Hoplistodera**

115. fergussoni Distant
116. scutellomaculata Distant
117. tonkinensis Distant
118. virescens Dallas

**Catacanthus**

119. aurantius Sulzer
120. incarnatus Drury

**Nezara**

121. antennata Scott
122. viridula Linnaeus

**Subgen. Acrosternum**

123. rubripennis Jakovlev

**Sabaeus**

124. humeralis Dallas

**Anaca**

125. punctiventris Breddin

**Plautia**

126. fimbriatus (Fabricius)
(= P. crossota (Dallas))

**Glaucias**

127. beryllus var. crassa (Westwood)

**Axiagastus**

128. mitescens Distant

**Critheus**

129. *lineatifrons Stal

**Eurysaspis**

130. flavescens Distant

**Antestia**

131. anchora Thunberg

**Otantestia**

132. heterospila (Walker)

**Menida**

133. bengalensis (Westwood)
(= Cimex histrio Fabricius)
134. formosa (Westwood)
135. laosana Distant
136. ?megaspila Walker
137. ornata Kirkaldy
138. quadrimaculata Horvath
139. raja Distant
140. salvazana Distant
141. scotti Puton
142. vitalisana Distant

**Piezodorus**

143. hybneri (Gmelin)
(= Cimex rubrofasciatus Fabr.)

**Dabessus**

144. *malayanus Distant

**Udonga**

145. spinidens Distant

**Rhaphigaster**

146. nebulosa Poda

**Neojurtina**

147. typica Distant

**Rhynchocoris**

148. *humeralis (Thunberg)
149. nigridens Stal

**Iphiarusa**

150. aratrix Breddin

**Priassus**

151. excofferi J. Martin

**Pentatoma**

152. armandi G. Fallou
153. davidi Signoret
154. illuminata Distant

**Amyntor**

155. obscurus Distant
(= Halys obscura Dallas)

**Homalogonia**

156. obtusa Distant
(= Pentatoma obtusa Walker)

**Exithemus**

157. mausonicus Breddin

**Placosternum**

158. dama Stal
(= Cimex dama Fabricius)
159. taurus Amyot & Serville
(= Cimex taurus Fabricius)
160. urus Stal

*Tribe AEPTINI*

**Halyabbas**

161. unicolor Distant

**Dorpius**

162. kershawi Kirkaldy

Tribe *HALYINI*

**Tachengia**

163. asora China

**Dalpada**

164. cinctipes Walker
165. concinna Westwood
(= Cimex clavatus Fabricius)
166. obscura (Westwood)
(= Halys obscura (Westwood))
167. oculata Fabricius
168. perelegans Breddin
169. varia Dallas

**Dendrites**

170. kershawi Kirkaldy

**Ouscha**

171. viridissima Distant

**Erthesina**

172. fullo Stal
(= Cimex fullo Thunberg)
173. ilia China

**Halys**

174. sulcata (Thunberg)
(= Cimex dentatus Fabricius)

Tribe *MYROCHEINI*

**Laprius**

175. gastricus (Thunberg)
(= Cimex gastricus Thunberg)
176. varicornis Distant
(= Sciocoris varicornis Dallas)

**Ochrorrhaca**

177. truncaticornis Breddin

**Aednus**

178. ventralis Dallas

Tribe *SCIOCORINI*

**Timuria**

179. melanocera Dallas

**Sciocoris**

180. microphthalmus Flor.

Subfamily GRAPHOSOMATINAE

**Graphosoma**

181. rubrolineata (Westwood)
(= Scutellera rubrolineata (Westwood))
(= G. rubrolineatum Horvath)

**Brachycercoris**

182. camelus A. Costa

**Scotinophara**

183. lurida (Burmeister)
(= Tetyra lurida Burmeister)
(= Podops lurida Distant)
184. obscura (Dallas)
(= Podops obscurus Dallas)

**Dybowskyia**

185. reticulata Dallas

LIST OF SPECIES OF PENTATOMINAE OF DOUBTFUL POSITION:

186. Cimex cylpeatus Linnaeus
187. C. nigrispinus Fabricius
188. Rhaphigaster disjectus Uhler

Subfamily PHYLLOCEPHALINAE

**Metonymia**

189. glandulosa (Wolff)
(= Edessa glandulosa Wolff)

**Salvianus**

190. vitalisanus Distant

**Gonopsis**

191. ?affinis (Uhler)
(= Dichelops affinis Uhler)
192. salvazana Distant
193. tonkinensis Breddin

**Diplorhinus**

194. coloratus Distant
195. furcatus (Westwood)

**Tetroda**

196. denticulifera Bergroth
197. latula Distant

**Megarhamphus**

198. fuscus (Vollenhoven)
(= Megarhynchus fuscus Vollenhoven)
199. intermedius (Vollenhoven)
(= Megarhynchus intermedium Vollenhoven)
200. hastatus (Fabricius)
(= Aelia rostrata Fabr.)
201. truncatus (Westwood)

Subfamily DINIDORINAE

**Cyclopelta**

202. obscura Lep. & Serv.
203. parva Distant
204. rugosa Distant
205. *siccifolia (Westw.)

**Aspongopus**

206. chinensis Dallas
207. *sanguinolentus ? Westwood

**Megarhamphus**

208. mekongum Distant
209. pratti Distant
210. subpurpurascens Westwood

**subgen. Pissistes**

211. gracilicorne Dallas

**subgen. Pseudaradus**

212. brevicornis (Fabricius)
213. inermis (H—S.)
(= Amaurus inermis H—S.)
(= Megymenum inerme Dist.)
214. parallelum Vollenhoven

Subfamily SCUTELLERINAE

Tribe *ODONTOTARSINI*

**Irochrotus**

215. lanatus (Pallas)
216. mongolicus Jakovlev

**Phimodera**

217. argillacea Jakovlev
218. carinata Reuter
(= P. galgulina Kolenati)
219. var. callosa Reuter
220. var. reticulata Reuter
221. mongolica Reuter
222. testudo Jakovlev

**Eurygaster**

223. maurus (Linnaeus)
(= Cimex maurus Linnaeus)
224. sinica Walker

Tribe *TETYRINI*

**Hotea**

**subgen. Tylonca**

225. curculionoides (H—S.)

Tribe *SCUTELLERINI*

**Chrysocoris**

**subgen. Typic**

226. abdominalis (Westwood)
227. eques (Fabricius)

**subgen. Fitha**

228. indigoferus Distant
229. ornata (Dallas)
(= Callidea ornata Dallas)
230. puella (Vollenhoven)
(= Callidea puella Vollenhoven)
231. purpureus Stal
(= Cimex stockerus Fabr.)
232. stollii (Wolff)

**subgen. Cosmocoris**

233. coxalis (Stal)

**subgen. Eucorysses**

234. grandis (Thunberg)

OF UNCERTAIN SUBGENERIC POSITION (DESCRIBED UNDER **CHRYSOCORIS**)

235. praetextatus Breddin

**Calliphara**

**subgen. Chrysophara**

236. excellens (Burmeister)
237. munda Stal
238. nobilis (Linnaeus)

**Brachyaulax**

239. oblonga (Westwood)
(= Tectocoris oblonga (Westwood))

**Scutellera**

240. amethystina (Germar)
241. perplexa (Fabricius)
(= Cimex nobilis Fabr.)
(= T. perplexa (Westwood))

**Tetrarthria**

242. variegata Dallas

**Poecilocoris**
**subgen. typic.**

243. dissimilis J. Martin
244. druraei (Linnaeus)
245. latus Dallas
246. nepalensis
(= Pachycoris nepalensis H—S.)
247. var. affinis (Westwood)
248. nigricollis Horvath
249. ?plenisignatus Walker

**Tectocoris**

250. diophthalmus (Thunberg)
(= Cimex diophthalmus Thunberg)

**Cantao**
**subgen. typic.**

251. ocellatus (Thunberg)

Tribe *SPHAEROCORINI*

**Hyperoncus**

252. lateritius Distant

Tribe *ELVISURINI*

**Solenosthedium**

253. chinense Stal
254. rubropunctatum Vollenhoven
(= Scutellera rubropunctata Guerin)

Subfamily TESSARATOMINAE

Tribe *ONCOMERINI*

**Neosalica**

255. nigrovittata Distant

Tribe *TESSARATOMINI*

**Embolosterna**

256. taurus (Westwood)
(= Tessaratoma taurus (Westwood))

**Tessaratoma**

257. nigroscutellata Distant
258. papillosa (Drury)
(= Cimex papillosa Drury)

Tribe *EUSTHENINI*

**Vitruvius**

259. *insignis Distant

**Eusthenes**

260. diomedes Breddin
261. humeralis Distant
262. pratti Distant
263. robustus Distant
(= Tessaratoma robusta Lep. et Serv.)
264. saevus Stal
265. touchei G. Fallou
267. ulixes Breddin

**Eurostus**

268. heros Breddin
269. moutoni Montandon
270. ochraceus Montandon
271. validus Dallas

**Mattiphus**

272. splendidus Distant

**Xiongia**

273. elongata Distant

**Dalcantha**

274. alata Breddin

Subfamily ACANTHOSOMINAE

**Microdeuterus**

275. *megacephalus (H—S.)

**Acanthosoma**

276. korolkovi Jakovlev

**Sastragala**

277. edessoides Distant
278. firmata (Walker)

**Anaxandra**

279. taurina Kirkaldy

**Elasmucha**

280. dorsalis (Jakovlev)
(= Elasmostethus dorsalis Jakovlev)
281. fasciator (Fabricius)
(= Cimex fasciator Fab.)
282. nubila (Dallas)
283. rufescens (Jakovlev)

**Elasmostethus**

284. interstinctus Linnaeus

**Cyphostethus**

285. sinensis Schumacher

SPECIES OF DOUBTFUL AFFINITY

286. Acanthosoma vicinum Uhler

## Family COREIDAE

Subfamily COREINAE

**Derepteryx**

287. laticornis Breddin
288. obscurata Stal

**Prionolomia**

289. mandarina Distant

**Molipteryx**

290. fuliginosa (Uhler)
291. lunata (Distant)

**Mictis**

292. camelina Kiritshenko
293. falloui Reuter
294. fasciata Westwood
295. potanini Kiritshenko
296. serina Dallas
297. tenebrosa Fabricius

**Anoplocnemis**

298. bicolor Westwood
299. [1]dallasi Kiritshenko
300. lata Dallas
301. *phasiana Fabricius

**Petillia**

302. lobipes Westwood
303. tragus Fabricius

**Homoeocerus**

304. albiguttulus Stal
305. chinensis Dallas
306. dilatatus Horvath
307. distinctus Signoret
308. immaculipennis Stal
309. inornatus Stal
310. marginellus H—S.
311. punctipennis (Uhler)
312. singalensis Stal
313. sinicus Walker
314. unipunctatus Thunberg
315. *walkeri Kirby
316. walkerianus Lethierry & Severin
(= plagiatus Walker)

[1] The author raises the question whether this should be a new species or only a new subspecies, A. phasianus dallasi.

**Anacanthocoris**
317. concoloratus Uhler
318. striicornis Scott

**Sinotagus**
319. nasutus Kiritshenko

**Colpura**
320. obscura (Dallas)
321. lativentris (Motschulski)

**Notobitus**
322. longipes Dallas
323. meleagris Fabricius
324. sexguttattus Westwood

**Cloresmus**
325. modestus Distant
326. similis Dallas

**Hygia**
327.*opacus Uhler
328. touchei Distant

**Physomerus**
329. *grossipes (Fabricius)

**Acanthocoris**
330. clavipes Fabricius
331. scaber Linnaeus
332. *scabrator Fabricius

**Gonocerus**
333. lictor Horvath
334. *sp. near basalis Westwood

*** Plinachtus**
335. *bicoloropes Scott

**Cletus**
336. *bipunctatus Westwood.
337. punctiger Dallas
338. *feanus Distant
339. rusticus Stal
340. schmidti Kiritshenko
341. tenuis Kiritshenko

*** Cletomorpha**
342. *sp. near raja Distant

**Coreus**
343. eversmanni (Jakovlev)
344. sibiricus (Jakovlev)

**Mesocerus**
345. marginatus orientalis Kiritshenko
346. omoxys Kiritshenko
347. potanini (Jakovlev)

**Haploprocta**
348. pustulifera (Stal)
349. semenovi Jakovlev

**Eohydara**
350. fulviclava Bergroth

**Centrocoris**
351. volxemi (Puton)

Subfamily PSEUDOPHLOEINAE

**Clavigralla**
352. acantharis Fabricius
353. *horrens Dohrn
354. *scutellaris Westwood
355. tuberculata Dallas

Subfamily ALYDINAE

**Stenocephalus**
356. femoralis Reuter
357. horvathi Reuter

**Mutusca**
358. prolixa Stal

**Leptocorisa**
359. acuta Thunberg
360. nitidula Breddin
361. varicornis Fabricius

**Megalotomus**
362. castaneus Reuter

**Alydus**
363. zichy Horvath

**Riptortus**
364. linearis Fabricius
365. pedestris Fabricius

*** Daclera**
366. *sp. (probably new)

OF UNCERTAIN GENERIC POSITION

367. Acestra sinica Dallas

Subfamily CORIZINAE

**Corizus**
368. angularis Reuter
369. chinensis Dallas

**Serinetha**
370. abdominalis (Fabricius)
371. augur Fabricius

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# A Marine Biological Garden for Hawaii

(Discussions at a Pan-Pacific Science Supper, May 8, 1931. Chairman, Dr. Frederick Krauss, Director of Agricultural Extension, University of Hawaii.)

*Chairman:* The hour for our discussion has arrived. It is extremely gratifying to see how these gatherings continue to carry on in full force. I can well understand how thoroughly pleased Mr. Ford would be if he knew how this work is being conducted. It seems to me that the Friday evening programs have been well up to their past standard, and, in some cases, beyond. Tonight we are to be favored with a very unusual talk by Dr. R. N. Chapman on "Scientific Problems of the Pineapple Industry"—something in which we are all interested. I have a number of announcements, one of which is that Dr. L. O. Howard, chief of the Entomological Division of the Department of Agriculture for many years, is almost certain to be here in June or July

to spend some time with us. All old-timers will remember his great service to the Pan-Pacific Food Conservation Conference in 1924, from which was carried out the original plan for the Agricultural Conference in August of this year, at which he would doubtless have been the honorary chairman. We shall probably have Dr. Howard with us for some months preceding his visit and probable residence in Paris, France, from then on.

Another distinguished come-backer is to be Joseph Rock, whom many of you remember personally and others through reputation. I think it is quite definite that Dr. Rock will be back with us in the fall and is to be here for all time.

Here is a letter from Dr. Henry B. Ward, head of the Department of Zoology of the University of Illinois, which I should like to read. It has reference to the suggestion for an International Marine Biological Station which appears in the April-May Journal of the Pan-Pacific Research Institution, which I think most of you have received. I will read the first paragraph of this that you may know what the letter refers to:

**"It has been suggested recently at the Friday night science suppers that an International Marine Biological Laboratory be established on the grounds of the Pan-Pacific Research Institution, a laboratory entirely independent of any one government of the Pacific."**

I should commend to all of you the reading of this article. It is too long to read here in full.

Most of you who have followed this work will remember that Dr. David Starr Jordan was father of the thought that this apparently refers to. Dr. Ward's letter is as follows:

**"I am always interested in the Journal of the Pan-Pacific Research Institution. The recent number, however, has a discussion concerning an international marine biological station, which has proved of more than ordinary interest. I trust that this project may be pushed vigorously. It is important and the location is unique.**

**"What was said by Dr. Galtsoff regarding the expense and the needs of the Institution should be kept in mind most carefully. I can support emphatically all that was said. After experience of nearly forty years embracing European laboratories, those of the east coast and also of the west coast, I feel that the opportunities at Hawaii are so unusual that the move ought to be promoted with vigor."**

With reference to Dr. David Starr Jordan, most of you know that his condition is extremely serious. We do not know how much longer he may live. Let us hope that his 80th birthday may have several more added. In a recent notice from the New York Aquarium, contributions were asked for a bust to be made of bronze, said to be the finest likeness ever made of Dr. Jordan. Contributions of $1.00 or $5.00 up to any amount one might care to contribute will be very welcome if sent to the New York Aquarium. I saw an illustration of this bust and it seems to me to be a remarkable likeness, such as I should always like to remember when thinking of Dr. Jordan.

I shall ask Mr. Ehrhorn to tell us a little more of this Biological Laboratory, and we want free discussions. One of the important parts of these informal Friday evenings is the informal discussion.

*Mr. E. M. Ehrhorn,* entomologist: Years ago, when I was Superintendent of the Board of Agriculture and Forestry, I had the pleasure of meeting Dr. Mortenson, a Dane and one of the leading marine biologists of the world. I came in direct contact with him because at the time of his arrival the Danish Consul was absent from the territory. Fortunately, at that time I had several laboratories scattered about the wharves, and I told him that I would take care of him and turn over one of my laboratories to him for his work. Mr. Wm. Alanson Bryan was here at the time, but is now in Los Angeles, as director of the Los Angeles Museum. He was very much interested, and Mr. Langford, my assistant, also a great collector of shells, made the time very

pleasant for Dr. Mortenson, who told me that in all his travels over the world he had never found a place more suitable for his work than the Hawaiian Islands. He thought if it were possible to do anything toward establishing a marine biological station that it would be a great thing for all the scientists of the world. When Dr. Jordan stayed at the Pan-Pacific Research Institute, I had a talk with him about this matter, and my suggestion was that if we could get all the universities and scientific institutions about the Pacific to contribute annually toward a station in these islands they could have the benefit of sending their representatives here to work, and, at the same time, all the material gathered could be divided and given to the scientific institutions.

Dr. Jordan thought we would have to make a start first, get a building and shelter for the instruments. I repeated to Dr. Jordan that because of the cold waters around Oregon, Washington and California, the scientists up there would be willing, I thought, to have their representatives work in the nice warm waters here. He thought it might be a splendid idea, if we were going to build a laboratory in Hawaii to build it similar to the one at Woods Hole.

So that is where the matter now stands. I am very glad to hear this letter from Dr. Ward, and I am sure Honolulu would be a very centrally located place.

*Dr. Krauss:* Is there any further discussion on this important subject? The Journal says that the estimated cost for a small laboratory would be around $150,000 to $200,000. The buildings would be leased and the instruments would be bought.

*Mr. Harry Burhans:* What action is being taken on this correspondence?

*Dr. Krauss:* I am sorry to say that I do not know more than this. The idea is to make this a feature at the Agricultural Conference. Mr. Ford is now active in this matter in the Orient, I am sure. Miss Satterthwaite, do you happen to know what is being done to further this plan?

*Miss Satterthwaite:* Nothing at present, I believe, is being done toward establishing a station here, but I believe Mr. Ford's work in getting Mr. K. Mikimoto, the "Pearl King" of Japan, interested in establishing pearl fisheries here, could well be considered part of the program of a Marine Biological Station. Governor Lawrence M. Judd, at Mr. Ford's suggestion, has written Mr. Mikimoto a cordial invitation to come and survey the waters around Hawaii, this, however, to be done at Mr. Mikimoto's expense, the Territory having no appropriation for this purpose.

*Mr. Burhans:* I suggest we communicate with Delegate Houston and ask him to advise us further with regard to an appropriation of $200,000 by the Government to see if we could not get the matter in a more concrete form.

*Dr. Krauss:* I think Dr. Hugh Smith, of the U. S. Bureau of Fisheries, and now with the Ministry of Fisheries in Siam, is coming through here. Perhaps we can write Mr. Ford that there has been great interest manifested by this group. This letter from Dr. Ward will be referred to him, and all that will help. I think this is important enough to spend part of our hour on. Are there any fishermen here? The difficulty seems to be that the American institutions, especially universities along the Pacific, have marine stations of their own. Nothing can beat Puget Sound as a collection ground, and I have heard that the University of Oregon is building a station somewhere. The University of California certainly maintains her own station. Stanford has Pacific Grove. It is hard to expect these institutions to support something new when they already have their own stations.

*Mr. Burhans:* You refer to the University of California and the University of Oregon. We now have the University of Hawaii. Why couldn't that be included in the list?

*Dr. Krauss:* We have a small Marine Laboratory, and I have a feeling that if

the University of Hawaii were approached through President Crawford that is one way of starting this movement. What do you think, Mr. Westgate?

*Mr. J. M. Westgate*: Well, it seems to me that we already have our start at the Aquarium. We have an office and buildings and the Aquarium is part of the university. There are people working out there every day. I can't see why that isn't a start. There is a station near San Diego, California, and it seems to me that we have pretty near as good a start here, as far as equipment is concerned. Practical agriculture might well, I think, be included, and as for anybody wanting to come down from the Mainland, we would have no difficulty in establishing the necessary contacts for them.

*Dr. B. F. Hulse:* I was sent by the U. S. Government to Naples, also to Berlin, to study biology. My heart is sold to the islands and I am very much interested in this subject and would use my influence with other governments in that respect.

*Dr. Krauss:* Yes, it does seem to me that the nucleus is here. Dr. Waterman, may we hear from you?

*Dr. Waterman:* Everything I was going to say has been said. I might add, perhaps, that very few people know the Honolulu Aquarium is part of the university. They don't know that scientific or laboratory work is being done there. This plant is much better than the Stanford laboratory when I first saw it. It was very small, indeed.

*Dr. Krauss:* I would like to call on Dr. Chapman, who is the Dean of the School of Tropical Agriculture, to tell us how he believes we might help.

*Dr. R. N. Chapman:* I worked in 1924 for six weeks in this laboratory at Waikiki. I have visited a number of biological laboratories, in Naples, France, Germany, England and on the Mainland, and as we mention other institutions, I do not think there is the correlation between achievement and buildings which is usually assumed. I don't know how crowded it is now with university students. We could have students in chemistry, physiology, biology, psychology, and they could pay their fee at the institution. We could locate for them facilities in the Bishop Museum, the Hawaiian Sugar Planters' Association, the University of Hawaii, and the Pineapple Experiment Station, and all they would want is space in which to make their experiments. There would be certain work to do out on the ocean, and for this there would have to be a boat of some kind. The first thing is to have some one who wants to do the work. The best institutions are produced by slow growth. I am not sure that buildings are the first things needed.

*Dr. Waterman*: What marine problems are there here?

*Dr. Krauss*: I am glad you brought that up. I am not an expert on those things. I am going to ask Dr. Hulse to speak of the kelp proposition in California. What are the kelp resources in Hawaiian waters? Dr. Hulse, tell them what you told me.

*Dr. Hulse:* I am slated to give this talk at a later date. The principal thought that I have in mind is that we have been exploiting the land for a great many years. We have more water than land. If there is anything in the water which would benefit millions, we may be neglecting a prolific field. The mineral elements from the soil have been washed to sea for a great many years. Sea water is rich in that in which our bodies are more or less deficient—mineral salts and the food which we are producing. I have done considerable research work in Southern California, and there have been many experiments made in trying to utilize these minerals from the ocean. We get kelp, for instance, 20 to 40 feet under the surface of the sea, brought in by barges. When you divide anything that nature provides, an unbalanced ration results. We thought there was nothing of value in kelp excepting iodine. Then agar-agar was separated and proved to be of value in the arts, but contained little

or no food value. Further research, tracing back over hundreds of years, reveals that sea weed has been used to a considerable extent as human food, and recent experiments have proved its value as stock food. There is a plant operating in Southern California which is drying over 200 tons a day of sea weed for stock food. I have never seen a line advertising this product in the columns of any paper, yet all of this material is being readily marketed for stock food. It must have produced results in order to have been in such demand. It became quite an industry. Later we discovered that many people had been putting this dried kelp on the market as medicine, claiming very beneficial reaction. We found they were charging $5.00 a box for a few capsules and were getting away with it.

I have been wondering if in the warm waters about your islands there might not be sufficient growth of kelp to maintain a great stock food industry. I understand that the pineapple by-product, pineapple bran, had turned out to be rather an unbalanced ration and that the dairies are not using it as freely as they would like. What they need is something to balance that ration. In analyzing we find that the protein and minerals in the kelp would apparently furnish a more balanced ration in connection with the pineapple bran. The present bran dehydrators are idle a portion of the season and would be admirably suited to dry the kelp if it can be found in sufficient quantity. What we want to know is if any of you wise men know of any large kelp beds in these waters?

*Dr. Stearns:* I have made fishing trips around these islands, and one of the things that impressed me is the fact that we live on the peak of some of the greatest submarine mountains of the Pacific. There is a lack of extensive shallow benches on which to grow kelp, as near California. When you get to the edge of the reefs here, the ocean floor deepens rapidly to 20,000 feet. It seems true that kelp would have been brought here years ago if it would grow; therefore I think you would have trouble to find lagoons that would be deep enough. The Japanese go to outlying islands to fish, which is excellent proof that there is a lack of kelp to provide food for fish, so, it seems me, there is a poor outlook for a kelp industry.

*Dr. Hulse:* Isn't there a great bank off the coast north of the Pali, extending out into the sea 100 to 200 feet deep? I think one of the maps shows that there is.

*Dr. Stearns:* Yes, there is one.

*Dr. Hulse:* Well, that is the one I had in mind, as the best kelp is obtained at 100 to 150 feet. The kelp we mention is called tree kelp and in one instance I measured one branch which was 181 feet long. It grows practically straight up.

*Dr. Krauss:* All of this is very interesting, even if it does bring us back to the point where we started. From an analysis on this particular subject, we do think there is danger of laymen talking on subjects that are foreign to them. Therefore I feel that whatever may apply in California to marine life may have absolutely no application here. We need marine laboratories in Hawaii. My reaction is a challenge to build this laboratory, to establish even a small institution such as Dr. Chapman says is already here. Here is a problem that may bring an answer. If it does it is important. I am going to ask Dr. Hance, on behalf of the Chemical Division of the Hawaiian Planters' Association, to tell us something along this line. It seems we have just had a lead. My observations have been that while we have no great streams we have tremendous erosions, making banks along the coast. I am just enthusiastic enough to see in imagination one-half dozen or a dozen or twenty species of this kelp planted successfully. Ford says we are going to have pearl fisheries here. Another man says we are going to have all eastern shell fish. I believe that all of

this discussion is going to lead us to try out the things that others say may be done. Dr. Hance, can you say something about soil conditions and erosion in Hawaii?

*Dr. Hance:* I cannot tell you anything about soil that is washed into the sea.

*Dr. Krauss:* Mr. Westgate, what have you to say on the subject?

*Mr. Westgate:* Near the laboratory there are thick beds of oyster shells that existed here some ten or fifteen thousand years ago—two or three varieties of large oysters that have become extinct. Why can't we introduce them again and have a new additional food supply? Around Pearl Harbor there are numerous oyster beds, but the oysters are certainly not on the market.

*Dr. Krauss:* Might not these questions be fruitful work for a marine laboratory? The question that Dr. Waterman asked, "What would the function be—what would they have to do?" could then be answered. If we can show our industrials that there is a financial return I have a feeling that this $200,000 might be gotten together. And then again, we respond to the thought expressed by Dr. Chapman that the best industries are produced by slow growth.

*Mr. Westgate:* I have another thought. I will start a subscription by giving enough to buy a pair of oysters. Mama Oyster lays one billion eggs and in time will fill Pearl Harbor. Why not try it?

*Mr. Hance:* I believe this was done, but storms filled Pearl Harbor so full of sand that they died out. Many migrated, apparently. Is it feasible to put them in Pearl Harbor where they used to flourish so well?

*Mr. Moe:* You can't put an oyster just anywhere. You have to have regular beds for them. I would like to state that four years ago there were living oysters in Pearl Harbor. Whether there are living ones there now I don't know. They are probably there yet.

*Mr. Ehrhorn:* If we are talking about oysters, why not about pearl oysters?

*Dr. Stearns:* There were pearl oysters, because on the banks there have been shells stacked by Hawaiians, showing Hawaii has had oysters. I don't know what kind they were, but they are not the kind that occur in fossil beds. We may never raise oysters there with all the conditions that now exist, but probably at one time Pearl Harbor wasn't as turbulent as it is most of the time now. That condition probably killed oysters in that particular harbor. I was examining a log this morning and found that after drilling through 180 feet of mud there showed a 25-foot coral deposit. The upper layer would indicate that at one time the water was cool enough for coral to grow to a distance of 25 feet.

*Dr. Krauss:* All of this is being recorded and passes through the best channels. Dr. Henry Ward can be written, or anybody else you mention. Dr. Chapman feels that Dr. Ward would be a good man to make familiar with these things. Dr. Galtsoff would be one of the best authorities and would be glad to pass on any problem. Dr. Hugh Smith, whom we loaned to the Siamese Government, is one of the authorities. Dr. Chapman has just told me of a number of men who are marine biologists, and suggests that we invite these men to give us their ideas.

*Mr. Burhans:* A suggestion as to a Marine Biological Laboratory. Couldn't the chairman be empowered to get in touch, possibly with the Agricultural Department here, as to the proper way to go about this and to confer with authorities in the Bishop Museum—follow up the suggestions, and have a paper on the problem prepared?

*Dr. Krauss:* A record will be sent to Mr. Ford, to Dr. Ward and others. I believe it well to propose now that all the material be gotten together and then placed in the hands of some responsible person.